of cap 52, the four beams in the illustrative embodiment are still separate. At plane 11B, the diverging beams have spread further and have begun to overlap. At the plane indicated as 11C, the beams have overlapped and define an envelop 73 having an outer diameter which is slightly greater than the outer diameter of the catheter body 104. Preferably, at plane 11C, beams 70 will have overlapped to merge and cover a continuous pattern. Illustratively, such a merger will have occurred within a distance from the distal face 74 of tip 52 which is approximately equal to the outer diameter of catheter 104 (a typical diameter is 1.5 millimeters).

What is Claimed is:

1. A system for the surgical removal of biological material comprising,

a laser energy source operating with an output wavelength in the range of 1.4-2.2 micrometers,

an optical fiber,

means for directing the output of said laser source to the proximal end of said optical fiber, and

means attached to the distal end of the optical fiber for directing laser energy propagating down said fiber to a surgical site.

2. A system for the removal of biological tissue in accordance with Claim 1 wherein said optical fiber comprises a silica fiber purified to reduce the hydroxyl ion content as low as possible.

3. A system for the removal of biological tissue in accordance with Claim 1 wherein said laser source comprises a Holmium-doped Yttrium-Aluminum-Garnet laser.

4. A system for the removal of biological tissue in accordance with Claim 1 wherein said laser source comprises an Erbium-doped Yttrium-Aluminum-Garnet laser.

5. A system for the removal of biological tissue in accordance with Claim 1 wherein said laser source comprises a Holmium-doped Yttrium-Lithium-Fluoride laser.

6. A system for the removal of biological tissue in accordance with Claim 1 wherein said laser source comprises an Erbium-doped Yttrium-Lithium-Fluoride laser.

7. A system for the removal of biological tissue in accordance with Claim 1 wherein said laser source comprises a Thulium-doped Yttrium-Aluminum-Garnet laser.

8. A system for the removal of biological tissue in accordance with Claim 1 wherein said laser source is operated in a pulsed-mode.

9. A system for the removal of biological tissue in accordance with Claim 8 wherein said laser source is operated in a pulsed-mode with a pulse width substantially equal to 1 millisecond.

10. A system for the removal of biological tissue in accordance with Claim 1 further comprising an aiming laser source generating visible light output and means for directing said visible light output through said laser source and said optical fiber to align said laser and said fiber and to visually illuminate said surgical site.

11. A system for the surgical repair of biological material comprising,

a laser energy source operating in a continuous wave mode with an output wavelength in the range of 1.4-2.2 micrometers,

an optical fiber,

means for directing the output of said laser source to the proximal end of said optical fiber, and

means attached to the distal end of the optical fiber for directing laser energy propagating down said fiber to a surgical site.

12. A system for the repair of biological tissue in accordance with Claim 11 wherein said optical fiber comprises a silica fiber purified to reduce the hydroxyl ion content as low as possible.

13. A system for the repair of biological tissue in accordance with Claim 11 wherein said laser source comprises a Holmium-doped Yttrium-Aluminum-Garnet laser.

14. A system for the repair of biological tissue in accordance with Claim 11 wherein said laser source comprises an Erbium-doped Yttrium-Aluminum-Garnet laser.

15. A system for the repair of biological tissue in accordance with Claim 11 wherein said laser source comprises a Holmium-doped Yttrium-Lithium-Fluoride laser.

16. A system for the repair of biological tissue in accordance with Claim 11 wherein said laser source comprises an Erbium-doped Yttrium-Lithium-Fluoride laser.

17. A system for the repair of biological tissue in accordance with Claim 11 wherein said laser source comprises a Thulium-doped Yttrium-Aluminum-Garnet laser.

18. A system for performing surgical operations on biological material comprising,

a laser energy source operating with an output wavelength in the range of 1.4-2.2 micrometers,

a catheter having at least one lumen passing therethrough,

at least one optical fiber comprised of silica passing through said catheter lumen,

a focussing lens for directing the output of said laser source onto the proximal end of said optical fiber, and

a lens attached to the distal end of the optical fiber for directing laser energy propagating down said fiber to a surgical site.

19. A system for performing surgical operations on biological tissue in accordance with Claim 18 further comprising a fiber optic connector affixed to the proximal end of said fiber for holding said fiber.

20. A system for performing surgical operations on biological tissue in accordance with Claim 18 wherein said catheter

has an additional lumen passing therethrough, said additional lumen having an opening at the proximal and distal ends for communicating with said surgical site.

21. A system for performing surgical operations on biological tissue in accordance with Claim 18 wherein said optical fiber comprises a silica fiber purified to reduce the hydroxyl ion content as low as possible.

22. A system for performing surgical operations on biological tissue in accordance with Claim 18 wherein said laser source comprises a Holmium-doped Yttrium-Aluminum-Garnet laser.

23. A system for performing surgical operations on biological tissue in accordance with Claim 18 wherein said laser source comprises an Erbium-doped Yttrium-Aluminum-Garnet laser.

24. A system for performing surgical operations on biological tissue in accordance with Claim 18 wherein said laser source comprises a Holmium-doped Yttrium-Lithium-Fluoride laser.

25. A system for performing surgical operations on biological tissue in accordance with Claim 18 wherein said laser

source comprises an Erbium-doped Yttrium-Lithium-Fluoride laser.

26. A system for performing surgical operations on biological tissue in accordance with Claim 18 wherein said laser source comprises a Thulium-doped Yttrium-Aluminum-Garnet laser.

27. A system for performing surgical operations on biological tissue in accordance with Claim 18 wherein said laser source is operated in a pulsed-mode.

28. A system for performing surgical operations on biological tissue in accordance with Claim 27 wherein said laser source is operated in a pulsed-mode with a pulse width substantially equal to 1 millisecond.

29. A system for performing surgical operations on biological tissue in accordance with Claim 18 further comprising an aiming laser source generating visible light output and means for directing said visible light output through said laser source and said optical fiber to align said laser and said fiber and to visually illuminate said surgical site.

30. A system for the surgical repair of biological material comprising,

a laser energy source operating in a continuous wave mode and generating an output beam with a wavelength in the range of 1.4-2.2 micrometers,

a plurality of optical fibers,

a plurality of partially reflective mirrors arranged in series along the axis of said output beam for directing a portion of the output of said laser source to the proximal ends of said optical fibers, and

a plurality of focussing lenses positioned between said mirrors and the proximal ends of said fibers for focussing portions of said laser output to the proximal ends of said fibers, and

means attached to the distal end of the optical fiber for directing laser energy propagating down said fibers to a surgical site, said directing means holding said fibers in a fixed position relative to one another so that optical beams emanating from the distal ends of said fibers overlap to cover an area at least equal to the diameter of said catheter.

31. A system for the repair of biological tissue in accordance with Claim 30 wherein at least some of said optical fibers comprise silica fibers purified to reduce the hydroxyl ion content as low as possible.

32. A system for the repair of biological tissue in accordance with Claim 30 wherein said laser source comprises a Holmium-doped Yttrium-Aluminum-Garnet laser.

33. A system for the repair of biological tissue in accordance with Claim 30 wherein said laser source comprises an Erbium-doped Yttrium-Aluminum-Garnet laser.

34. A system for the repair of biological tissue in accordance with Claim 30 wherein said laser source comprises a Holmium-doped Yttrium-Lithium-Fluoride laser.

35. A system for the repair of biological tissue in accordance with Claim 30 wherein said laser source comprises an Erbium-doped Yttrium-Lithium-Fluoride laser.

36. A system for the repair of biological tissue in accordance with Claim 30 wherein said laser source comprises a Thulium-doped Yttrium-Aluminum-Garnet laser.

37. A system for the repair of biological tissue in accordance with Claim 30 further comprising a fiber optic connector affixed to the proximal ends of each of said fibers for holding said fibers.

38. A system for the repair of biological tissue in accordance with Claim 30 wherein said catheter has an additional lumen passing therethrough, said additional lumen having an opening at the proximal and distal ends for communicating with said surgical site.

39. A system for the repair of biological tissue in accordance with Claim 30 wherein said laser source is operated in a low-power continuous mode.

40. A system for performing surgical operations on biological tissue in accordance with Claim 30 further comprising an aiming laser source generating visible light output and means for directing said visible light output through said laser source and said optical fiber to align said laser and said fiber and to visually illuminate said surgical site.

41. A method for the surgical removal of biological material comprising the steps of:

A. operating a laser energy source to produce an output beam with a wavelength in the range of 1.4-2.2 micrometers,

B. directing the output of said laser source to the proximal end of an optical fiber, and

C. directing laser energy propagating down said fiber to a surgical site.

42. A method for the removal of biological tissue in accordance with Claim 41 wherein step A comprises the steps of operating said laser source in a pulsed-mode with a pulse width substantially equal to 1 millisecond.

43. A method for the surgical repair of biological material comprising the steps of:

A. operating a laser energy source in a continuous wave mode with an output wavelength in the range of 1.4-2.2 micrometers,

B. directing the output of said laser source to the proximal end of said optical fiber, and

C. directing laser energy propagating down said fiber to a surgical site.